No. 7200139

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Michigan State University

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF seventeen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

RYE

'Wheeler'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the City of* Washington *this* 25th *day of* January *in the year of our Lord one thousand nine hundred and* seventy-nine

Attest:

Commissioner
Plant Variety Protection Office
Grain Division
Agricultural Marketing Service

Secretary of Agriculture

FORM GR-470
(2-12-71)

UNITED STATES DEPARTMENT OF AGRICULTURE
CONSUMER AND MARKETING SERVICE
GRAIN DIVISION
HYATTSVILLE, MARYLAND 20782

FORM APPROVED
OMB NO. 40-R3712

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

INSTRUCTIONS: *See Reverse.*

1. VARIETY NAME OR TEMPORARY DESIGNATION	2. KIND NAME	FOR OFFICIAL USE ONLY
Wheeler	Rye	PVPO NUMBER 72139
3. GENUS AND SPECIES NAME	4. FAMILY NAME *(Botanical)*	FILING DATE 5/25/72 — TIME 3:00 A.M. (P.M.)
Secale cereale	5. DATE OF DETERMINATION June, 1970	FEE RECEIVED $ 150.00 — CHARGES

6. NAME OF APPLICANT(S)	7. ADDRESS *(Street and No. or R.F.D. No., City, State, and ZIP Code)*	8. TELEPHONE AREA CODE AND NUMBER
Michigan State University	East Lansing, Michigan	(517) ext 8/28/73 353-9545

9. IF THE NAMED APPLICANT IS NOT A PERSON, FORM OF ORGANIZATION: *(Corporation, partnership, association, etc.)*	10. STATE OF INCORPORATION	11. DATE OF INCORPORATION
State University	Michigan	1855

12. Name and mailing address of applicant representative(s), if any, to serve in this application and receive all papers:

L. O. Copeland
Extension Seed Specialist
Department of Crop and Soil Sciences
Michigan State University
East Lansing, Michigan 48823

13. CHECK BOX BELOW FOR EACH ATTACHMENT SUBMITTED:

- [X] 12A. Exhibit A, Origin and Breeding History of the Variety *(See Section 52, P.L. 91-577)*
- [X] 12B. Exhibit B, Botanical Description of the Variety ext 8/14/78
- [X] 12C. Exhibit C, Objective Description of the Variety
- [X] 12D. Exhibit D, Data Indicative of Novelty
- [X] 12E. Exhibit E, Statement of the Basis of Applicant's Ownership

The applicant declares that a viable sample of basic seed of this variety will be deposited upon request before issuance of a certificate and will be replenished periodically in accordance with such regulations as may be applicable. *(See Section 52, P.L. 91-577).*

14A. Does the applicant(s) specify that seed of this variety be sold by variety name only as a class of certified seed? *(See Section 83(a), P.L. 91-577) (If "Yes," answer 14B and 14C below.)* [X] YES [ ] NO

14B. Does the applicant(s) specify that this variety be limited as to number of generations?	14C. If "Yes," to 14B, how many generations of production beyond breeder seed?
[X] YES [ ] NO	Two (2)

Applicant is informed that false representation herein can jeopardize protection and result in penalties.

The undersigned applicant(s) of this sexually-reproduced novel plant variety believes that the variety is distinct, uniform, and stable as required in Section 41 and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act (P.L. 91-577).

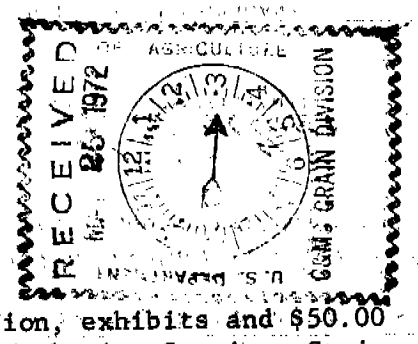
5/22/72
(DATE)

× [signature]
(SIGNATURE OF APPLICANT)

(DATE)

(SIGNATURE OF APPLICANT)

FORM GR-470 (REVERSE)



INSTRUCTIONS

GENERAL: Send an original copy of the application, exhibits and $50.00 fee to U.S. Dept. of Agriculture, Consumer and Marketing Service, Grain Division, Hyattsville, Maryland 20782. Retain one copy for your files. All items on the face of the form are self-explanatory unles noted below.

ITEM

5 Insert the date the applicant determined that he had a new variety.

12a First, give the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method. Second, give the details of subsequent stages of selection and multiplication. Third, indicate the type and frequency of variants during reproduction and multiplication and state how these variants may be identified. Fourth, provide evidence on stability.

12b First, give any special characteristics of the seed and of the plant as it passes through the seedling stage, flowering stage and the fruiting stage. Second, describe the mature plant and compare it with a similar commercial variety grown under the same conditions, and indicate the differences.

12c A supplemental form will be furnished by the PVPO to describe in detail a variety for each kind of seed.

12d Provide complete data indicative of novelty. Seed and plant specimens may be submitted and seeds submitted may be sterile. Where possible, include photographs of plant comparisons, chemical tests, etc.

12e Indicate whether applicant is the actual breeder, the employer of the breeder, the owner through purchase or inheritance, etc.

FORM APPROVED: OMB NO. 40-R3712

FORM GR-470-41
(7-77)

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
GRAIN AND SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Rye)

OBJECTIVE DESCRIPTION OF VARIETY

RYE *(Secale cereale L.)*

NAME OF APPLICANT(S)	VARIETY NAME OR TEMPORARY DESIGNATION
Agricultural Experiment Station, Michigan State University	Wheeler
ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code)*	FOR OFFICIAL USE ONLY
East Lansing, MI 48824	PVPO NUMBER 72139

Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less. The symbol ▲ indicates a decimal point. Characteristics described, including numerical measurements should represent those that are typical for the variety. All questions need not be answered, however, the more complete the information given the more adequate the variety will be identified.

1. PLOIDY:

[2] 1 = DIPLOID (2N = 14) 2 = TETRAPLOID (2N = 28) 3 = OTHER *(Specify)* _____

2. ADAPTATION:

[1] 1 = NORTH 2 = SOUTH

3. GROWTH HABIT:

[3] 1 = SPRING 2 = INTERMEDIATE 3 = WINTER

[ ] PHOTOPERIOD: 1 = Insensitive 2 = Sensitive

[3] JUVENILE PLANT GROWTH: 1 = Erect 2 = Intermediate 3 = Prostrate

4. EAR EMERGENCE:

[ ][ ] DAYS EARLIER THAN . . . . . [ ]

EMERGENCE SAME AS . . . . . [ ]

[ ][3] DAYS LATER THAN . . . . . [7]

1 = Von Lochow 2 = Frontier 3 = Cougar
4 = Rymin 5 = Florida Black 6 = Weser
7 = Gator

5. MATURITY:

[ ] 1 = VERY EARLY 2 = EARLY 3 = MIDSEASON 4 = LATE 5 = VERY LATE

[ ][ ] DAYS EARLIER THAN . . . . . [ ]

MATURITY SAME AS . . . . . [ ]

[ ][3] DAYS LATER THAN . . . . . [7]

1 = Von Lochow 2 = Frontier 3 = Cougar
4 = Rymin 5 = Florida Black 6 = Weser
7 = Gator

6. HEIGHT *(from soil level to top of spike)*:

[1][3][5] CM. HIGH *(at maturity)* . . . . . [5]

1 = Dwarf 2 = Semidwarf 3 = Short
4 = Midtall 5 = Tall

[ ][ ] CM. SHORTER THAN . . . . . [ ]

HEIGHT SAME AS . . . . . [ ]

[2][0] CM. TALLER THAN . . . . . [7]

1 = Von Lochow 2 = Frontier 3 = Cougar
4 = Rymin 5 = Elbon 6 = Weser
7 = Gator

7. STEM:

[ ][5] MM. STEM DIAMETER *(4 inches above ground)* [1] NODES: 1 = Solid 2 = Intermediate 3 = Hollow

[1] NECK HAIRINESS: 1 = Glabrous 2 = Slightly Hairy 3 = Moderately Hairy 4 = Densely Hairy

[1] ANTHOCYANIN IN UPPERMOST NODE: 1 = Absent 2 = Present

5

7. STEM *(Cont'd)*

[3][5][0] CM. INTERNODE LENGTH *(Between flag leaf and leaf below)*

[4] MORE TILLERS THAN . . . . . [4]

SAME NO. TILLERS AS . . . . . [ ]

FEWER TILLERS THAN . . . . . [ ]

1 = Von Lochow 2 = Weser 3 = Frontier 4 = Tetra Petkus

[1] RESISTANCE TO LODGING: 1 = Good *(Seldom lodged)* 2 = Fair *(Often lodged)* 3 = POOR *(Usually lodged)*

8. LEAVES:

[3][0][0] CM. LEAF LENGTH *(1st leaf below flag leaf)* [1][0] MM. LEAF WIDTH *(1st leaf below flag leaf)*

[1] FLAG LEAF: 1 = Not Twisted 2 = Twisted [4] NO. LEAVES ORIGINATING FROM NODES ABOVE GROUND

[1] WAXY BLOOM ON LEAF *(at boot)*; 1 = Absent 2 = Slightly Waxy 3 = Waxy

[1] UPPER LEAF SURFACE *(at boot)*: 1 = Glabrous 2 = Lightly Spinous 3 = Pubescent

[1] LEAF COLOR *(at boot)*: 1 = Dark Green *(Frontier, Weser)* 2 = Light Green *(Florida Black)* 3 = Other *(specify)* _____

[1] MAIN STEM LEAF HABIT *(during tillering)*: 1 = Upright 2 = Recurved 3 = Drooping [1] MAIN STEM LEAF HABIT *(at boot)*: 1 = Upright 2 = Recurved 3 = Drooping

[1] LEAF SHEATH *(at boot)*: 1 = Glabrous 2 = Lightly Spinous 3 = Pubescent [1] ANTHOCYANIN IN AURICLES: 1 = Absent 2 = Present

9. HEAD:

[1] DENSITY: 1 = Lax *(Frontier)* 2 = MIDDENSE *(Tetra Petkus)* 3 = Dense *(Cougar)* [3] ATTITUDE: 1 = Erect 2 = Slightly Curved 3 = Inclined

[2] SHAPE: 1 = Fusiform *(Tapering)* 2 = Parallel 3 = Oblong 4 = Elliptical 5 = Clavate 6 = OTHER *(Specify)* _____

[1] WAXY BLOOM: 1 = Absent 2 = Slightly Waxy 3 = Waxy [1] ANTHOCYANIN: 1 = Absent 2 = Present

[1] RESISTANCE TO SHATTERING: 1 = Good 2 = Fair 3 = Poor

[1] HEAD LENGTH: 1 = Long 2 = Mid-Long to Long 3 = Mid-Long 4 = Short to Mid-Long 5 = Short

[1][6][0] CM. HEAD LENGTH *(Excluding awns)* [ ][5][0] CM. AWN LENGTH

[1][0] MM. HEAD WIDTH

[1] ANTHOCYANIN IN AWNS: 1 = Absent 2 = Slightly Pigmented 3 = Strongly Pigmented

10. COLEOPTILE COLOR:

[3] 1 = Green 2 = Red *(Purple)* 3 = Mixed

11. SEED:

COLOR *(Total = 100%)*

[ ] % *Black* [ ] % *Gray* [ ] % *Blue* [ ] % *Blue-Green*

[ ] % *Green* [ ] % *Olive-Green* [ ] % *Yellow* [ ] % *Tan*

[ ] % *Brown* [1][0][0] % Other *(Specify)* gray-brown [ ] % *Other (specify)* _____

[1] ALEURONE COLOR: 1 = Colorless *(White)* 2 = Blue [4][7][0] GRAMS PER 1000 SEEDS

[1] ENDOSPERM: 1 = Light 2 = Dark 3 = Mixed

[ ] SHAPE: 1 = Elliptical 2 = Fusiform 3 = Other *(Specify)* _____

11. SEED *(Cont'd)*

3 SIZE: 1 = Small *(Caribou)* 2 = Medium *(Puma)* 3 = Large *(Rymin)* 4 = Very Large *(Tetra Petkus)*

3 4 0 MM. WIDE 1 0 0 MM. LONG [ ] SURFACE: 1 = Smooth 2 = Other *(Specify)* slightly rough

0 8 - 0 * Ear 10/18/78

12. DISEASE AND INSECT RESISTANCE (0 = Not Tested, 1 = Susceptible, 2 = Resistant. Indicate as completely as possible including species and races where known):

		COMMENTS
0	Leaf rust - *Puccinia recondita*	
0	Stem rust - *P. graminis secalis*	
0	Stripe rust - *P. glumarum*	
0	Powdery mildew - *Erysiphe graminis secalis*	
0	Anthracnose - *Colletotrichum graminicola*	
0	Scald - *Rhyncosporium secalis*	
0	Ergot - *Claviceps purpurea*	
	Other disease _____	
	Other disease _____	
	Insect _____	
	Insect _____	

13. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THE APPLICATION VARIETY FOR THE FOLLOWING CHARACTERS:

CHARACTER	VARIETY	CHARACTER	VARIETY
Growth Habit	Tetra Petkus	Tillering	
Leaf Width	Tetra Petkus	Ear Emergence	
Leaf Length	Tetra Petkus	Area of Adaptation	Balboa
Leaf Color	Tetra Petkus	Winter Hardiness	Balboa
Leaf Carriage	Tetra Petkus	Drought Resistance	Balboa
Seed Shape		Lodging	Tetra Petkus
Seed Size		Shattering	Tetra Petkus

14. ADDITIONAL DESCRIPTION *(Use additional sheets as required):* **Describe all characteristics that cannot be adequately described in the form above. Comparative varieties should be used where appropriate, such as for disease. Append all comparative trial and evaluation data.**

* as per Telephone call.

Addendum: To form GR-470
Item 12A - 12E

12A. The first crosses between cereal ryes and perennial mountain ryes (Secale Montanum Guss.) were made in 1959 and 1960. The hybrid seeds resulting were treated with colchicine and a number of tillers with double chromosome complement were found. At flowering time, one of these heads was pollinated with pollen taken from a similarly double head on the cereal rye variety, Gator. The population resulting from this cross was isolated from other ryes and allowed to open-pollinate. In succeeding generations a selection for fertility was practiced for seven years at which time the fertility was acceptable for release purposes. During this period selection for seed yields was also performed.

12B. Spikelets, two-flowered, solitary, placed flatwise against the rachis, the rachilla disarticulating above the glumes and produced beyond the upper floret as a minute stipe; glumes narrow, rigid, acuminate or subulate-pointed; lemmas broader, sharply keeled, 5-nerved, ciliate on the keel and exposed margins, tapering into a long arm. Erect, winter annual grass, with flat blades; ~~and dense spikes.~~ inflorescence, a spike.

10/2/78 Ecr as per telephone call.

~~12C. To be completed when appropriate forms are available from U.S.D.A., C. and MS.~~

Ecr 8/14/78

~~12D. See attached data.~~ Ecr 8/25/78

~~12E.~~ Fred C. Elliott, breeder; L. O. Copeland acting as seed stocks ~~representative for the~~ Department of Crop and Soil Sciences, Michigan State University.

Ecr 8/25/78

WHEELER RYE

The distinguishing feature of Wheeler rye is late maturity. Wheeler starts growth in early spring and stays in a vegetative condition at least two weeks longer than common ryes which still facilitates ensiling at early heading stages around May 20 at East Lansing.

The first crosses between cereal ryes and perennial ryes entering into Wheeler were made in 1959 and 1960 by Dr. Mansour Nicknejad of Iran. Chromosome numbers of these F_1 hybrids were doubled with Colchicine and outcrossed to doubled Gator. The population resulting from this cross was isolated from other ryes and selection for fertility was practiced. From 1962 to 1965 it was included in forage tests by Professor Harold Kohls and showed significant increases in forage yields over Balbo or Rosen. Animal feeding trials of silage made from this selection in a double-cropping sequence with corn at East Lansing have been carried out for three years by the Dairy and Animal Husbandry Departments.

Since seed production must be satisfactory and economically competitive to maintain seed stocks for forage uses emphasis since 1965 has been directed to improvement of seed yields in Wheeler. Since tetraploid and diploid ryes cannot be tested for seed yields in the same trials we have presented yields of Genessee winter wheat as a check at East Lansing.

The name Wheeler is given in recognition of the contribution of Professor E. J. Wheeler to Michigan agriculture and to the rye program.

EXHIBIT A

Wheeler rye is a variety with homogenous and stable germ plasm when grown under conditions of suitable isolation from other rye varieties which represent outcrossing potential. Although Wheeler in its true form does not have any known genetic variants within the variety, like most other varieties of cross pollinated species, there is some variablity in seed color, size and shape, as well as plant height. However, these differences are not beyond those that could be expected from normal environmental influences, and can not be catagorized as genetic variants. If grown under conditions of outcrossing, however, noticeable evidences of genetic deterioration begin to occur, e.g., sterile progeny, increased susceptibility to, and influence of, ergot, and various cytological abnormalities.

EXHIBIT D

Wheeler is a tetraploid variety and can be readily distinguised from all diploid varieties by its larger seed size, more rigorous plant growth, and relative lateness in producing seed heads. The tetraploid variety most similar to Wheeler is Tetra Petkus, however, unlike Tetra Petkus, Wheeler was developed as a forage rye and can be distinguished from Tetra Petkus in the following ways: (1) it produces about 2 to 4 more tillers per plant and about 50% more forage than Tetra Petkus, ~~(2) its seed tends to be about 4 mm by 10 mm in size compared to about 5 mm by 11 mm for Tetra Petkus,~~ (3) Wheeler plants tend to be 12 to 15 cm taller than those of Tetra Petkus, and (4) Wheeler plants produce seed heads about 4 to 7 days earlier than those of Tetra Petkus.

Exh 10/8/78 as per telephone call

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF CROP AND SOIL SCIENCES
SOIL SCIENCE BUILDING

EAST LANSING · MICHIGAN · 48824

EXHIBIT E

Wheeler rye was developed by Dr. Fred C. Elliott, plant geneticist, Michigan State University, Department of Crop and Soil Sciences, and is the property of Michigan State University.

D. D. Harpstead, Chairman
Department of Crop and Soil Sciences

COOPERATIVE EXTENSION SERVICE • UNIVERSITY OF MARYLAND • COLLEGE PARK, MARYLAND

1976-1977 FIELD CROP VARIETY RECOMMENDATIONS FOR MARYLAND

BULLETIN 249

Small Grains

Certified seed is the best guarantee of varietal purity. Varieties for which certified seed is available are marked with an asterisk (*).

Winter Barley

Rapidan*—Medium maturity, beardless, stiff straw, high yields, winter hardy. (Regions 1, 2, 3, 4).

Henry*—Medium maturity, beardless, stiff straw, high yields, good disease resistance to powdery mildew, leaf rust and scald. (Regions 1, 2, 3, 4,).

Volbar*—Medium maturity, bearded high yields, tall stiff straw. (Regions 1, 2, 3).

Barsoy*—Early maturity, bearded, short, stiff straw, good yields, excellent for double-cropping. (Regions 1, 2, 3).

Hanover*—Medium maturity, beardless, short straw, good yields. (Regions 1, 2, 3).

Jefferson*—Medium maturity, semi-bearded, stiff straw, good yields, winter hardy. (Regions 2, 3, 4, 5, 6).

Monroe*—Late maturity, beardless, stiff straw, high yields, good disease resistance to powdery mildrew, leaf rust and scald. (Regions 1, 2, 3, 4, 5, 6,).

Spring Barley

Moore*—Six-row, smooth bearded, stiff straw, late maturing. (Region 6).

Winter Oats

Norline*—Good yields, winter hardy, tall, stiff straw. (Regions 1, 2, 3).

Compact*—Medium maturity, good yields, short, stiff straw. Good resistance to smut, susceptible to crown rust. Not as winter hardy as Norline. (Regions 1, 2, 3).

Pennlan*—Medium early, good yields, stiff straw, winter hardy. Seed not readily available. (Regions 1, 2, 3).

Windsor*—Medium maturity, short, stiff straw, good yield and test weight, fair resistance to crown rust, good resistance to mosaic and mildew. (Regions 1, 2, 3).

Spring Oats

Clintford*—Medium maturity, short, stiff straw, good test weight and yield, some resistance to crown and stem rust and loose smut, susceptible to Septoria. (Regions 3, 4, 5, 6).

Clintland 64*—Resistant to Helminthosporium (blight), most races of crown, stem rust and smut. Stiff straw of medium height, good yields. (Regions 3, 4, 5, 6).

Garry*—Late maturity. Taller than Clintland 64. Kernels short, plump and of good quality. Resistant to Helminthosporium (blight). (Regions 4, 5, 6).

Jaycee*—Early maturity, short stiff straw, high yields, large plump kernels. Resistance to most races of stem rust, crown rust and smut. Some resistance to Barley Yellow Dwarf. (Regions 3, 4, 5, 6).

Noble*—Good yield and lodging resistance, maturity similar to Jaycee, tolerant to yellow dwarf virus, some resistance to loose smut, older races of crown and stem rust. (Regions 3, 4, 5, 6).

Otee*—Early maturity, short, stiff straw, similar to Jaycee, tolerant to crown rust, resistant to yellow dwarf, high protein rating. (Regions 3, 4, 5, 6).

Stout*—Short, stiff straw, good test weight, compact head, some resistance to stem rust, crown rust, and loose smut, susceptible to yellow dwarf virus. (Regions 3, 4, 5, 6).

Rye

Abruzzi*—For grain, forage or green manure. (Regions 1, 2, 3, 4, 5, 6).

Balbo*—Very similar to Abruzzi in characteristics and adaptation. (Regions 1, 2, 3, 4, 5, 6).

Hiwassee*—Limited seed supply. (Regions 1, 2, 3, 4, 5, 6).

Wheeler, WR811—More leafy, provides excellent fall and spring pasture. (Regions 1, 2, 3, 4).

Commercial varieties for forage are available. Consult your Extension agent for the performance of commercial forage varieties.

Wheat

Arthur*—Good yields and bushel weight, 5 days earlier than Blueboy, short stiff straw, some resistance to mildew, rust, loose smut and soil borne mosaic .(Regions 1, 2, 3, 4, 5, 6).

Abe*—Good yields, excellent bushel weight, short stiff straw, resistant to powdery mildew, leaf rust and Hessian fly. (Regions 1, 2, 3, 4, 5, 6).

Potomac*—Good yields, excellent bushel weight, tall straw, 4 days later than Arthur, moderate resistance to leaf rust and powdery mildew. (Regions 1, 2, 3, 4, 5, 6). Limited seed available in 1976.

Redcoat*—White chaff, short beards, tall stiff straw, late maturity. (Regions 1, 2, 3, 4, 5, 6).

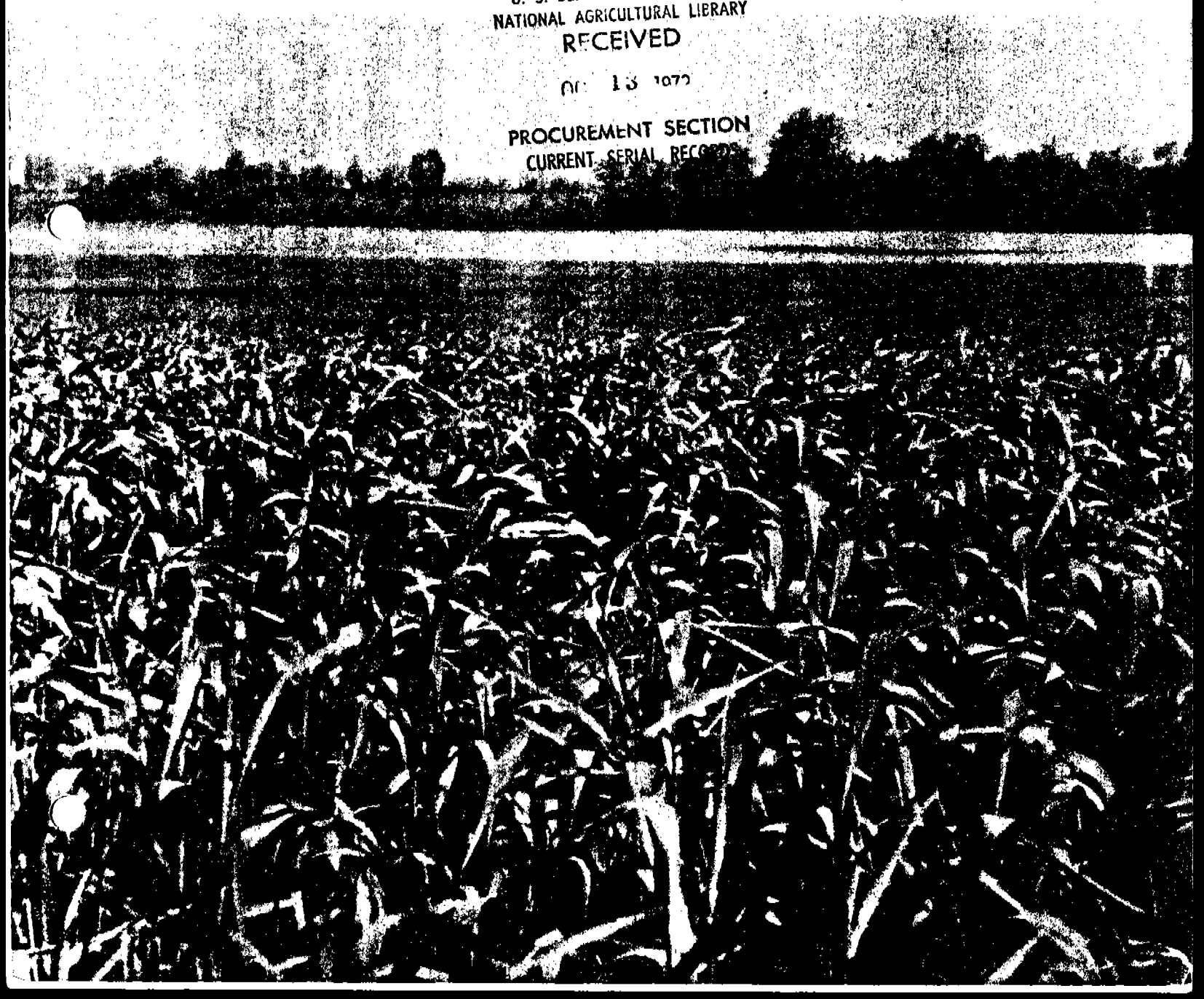
Commercial varieties are available. Consult your Extension agent for the performance of commercial varieties tested to date.

July, 1972

RESEARCH REPORT

FROM THE MICHIGAN STATE UNIVERSITY
AGRICULTURAL EXPERIMENT STATION EAST LANSING

WHEELER RYE-- for Forage and Green Manure



WHEELER RYE-- for Forage and Green Manure

COVER: Wheeler is leafier and produces more green matter than most commonly grown ryes.

by L. O. Copeland and F. C. Elliott [1]

Fig. 1. Dr. Fred C. Elliott, Michigan State University plant breeder and developer of Wheeler rye.

INTRODUCTION

Wheeler, released by the Michigan Agricultural Experiment Station in 1971, is a tetraploid forage rye variety. It has the potential for producing high yields of forage for use as silage, pasture or as a green manure crop. The variety was named Wheeler after Professor E. J. Wheeler, who fostered the rye green manure program in potato rotations.

PEDIGREE

Wheeler was developed by Dr. Fred C. Elliott, Michigan State University plant breeder (Fig. 1). It is a cross between Gator cereal rye from Florida and a perennial oriental rye (Fig. 2). The hybrid seeds resulting from this cross were treated with colchicine to double the chromosome complement. The one plant obtained was back-crossed with a Gator plant, similarly doubled with colchicine. The plant population resulting from these crosses was isolated and open-pollinated for several generations. During this time, it was screened for fertility and seed yields.

[1] Extension Seed Specialist and Professor of Crop Science, Department of Crop and Soil Sciences, respectively.

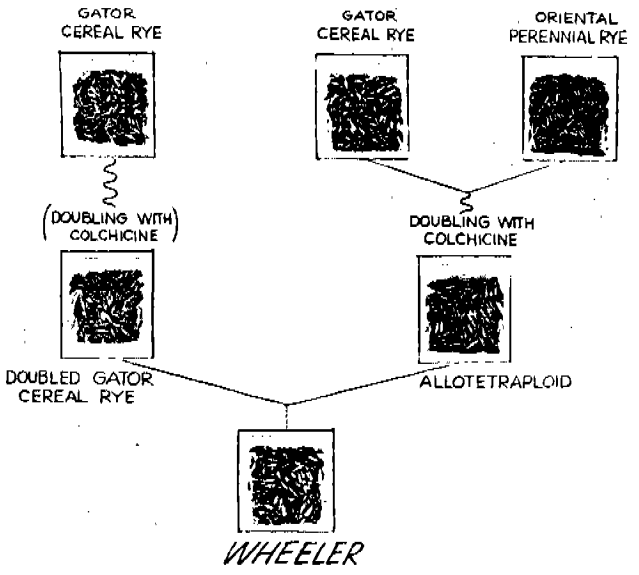


Fig. 2. Origin of Wheeler rye illustrating cross between Gator cereal rye and a perennial oriental rye.

PERFORMANCE AND ADAPTABILITY

Wheeler is a leafy, vigorous growing rye adapted to the lower Great Lakes Region. It matures 1 to 2 weeks later than Balbo (Fig. 3), is leafier, and has produced 14% more forage in four years of testing at East Lansing and Lake City (Table 1).

Feeding trials by Michigan State University dairy scientists show that heifers gained as well on Wheeler rye silage as on alfalfa haylage. Efficiency of gain was higher on Wheeler, although animal intake was lower than for alfalfa. Trials with lactating cows showed equal production on rye silage, alfalfa haylage, or on a combination of the two. Digestibility studies with sheep showed that rye had higher total digestible nutrients (TDN) than alfalfa haylage.

While its chief use is in forage production, Wheeler will produce high yields of grain. In seven years of tests at East Lansing, grain yields have been 95% of those for Genesee wheat.

Table 1. Forage yields of Wheeler Rye (Tons per acre at 12% moisture, harvested in late May - early June).

Year	Balbo	Wheeler
	East Lansing	
1964	2.77	3.51
1965	1.82	2.36
1968	2.56	2.45
Average	2.38	2.77
	Lake City	
1964	2.84	3.17
1965	3.00	3.59
1968	1.46	1.73
1969 (a)	1.63	1.71
1969 (b)	1.44	1.54
Average	2.07	2.35
Average, 8 tests [1964-1969]	**2.19**	**2.51**

(a) Planted Oct. 5, 1968, after sorghum sundangrass disked twice.

(b) Planted Aug. 1, 1968; one fall and two spring cuttings.

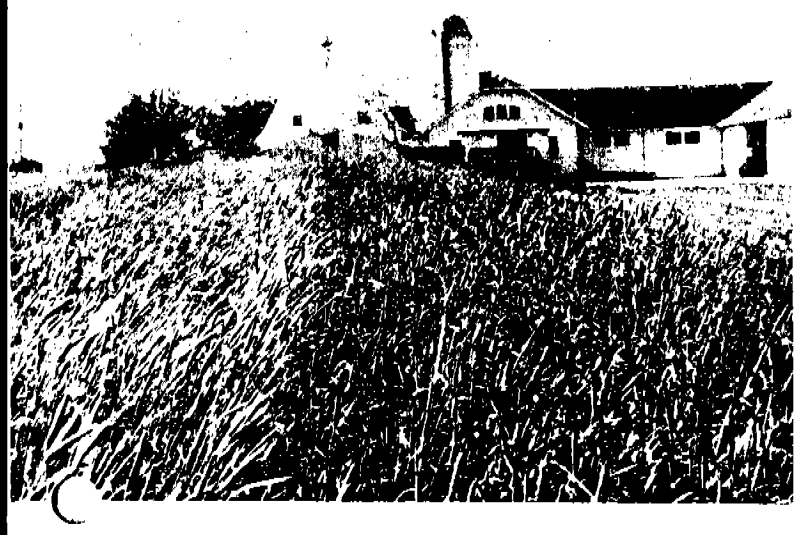


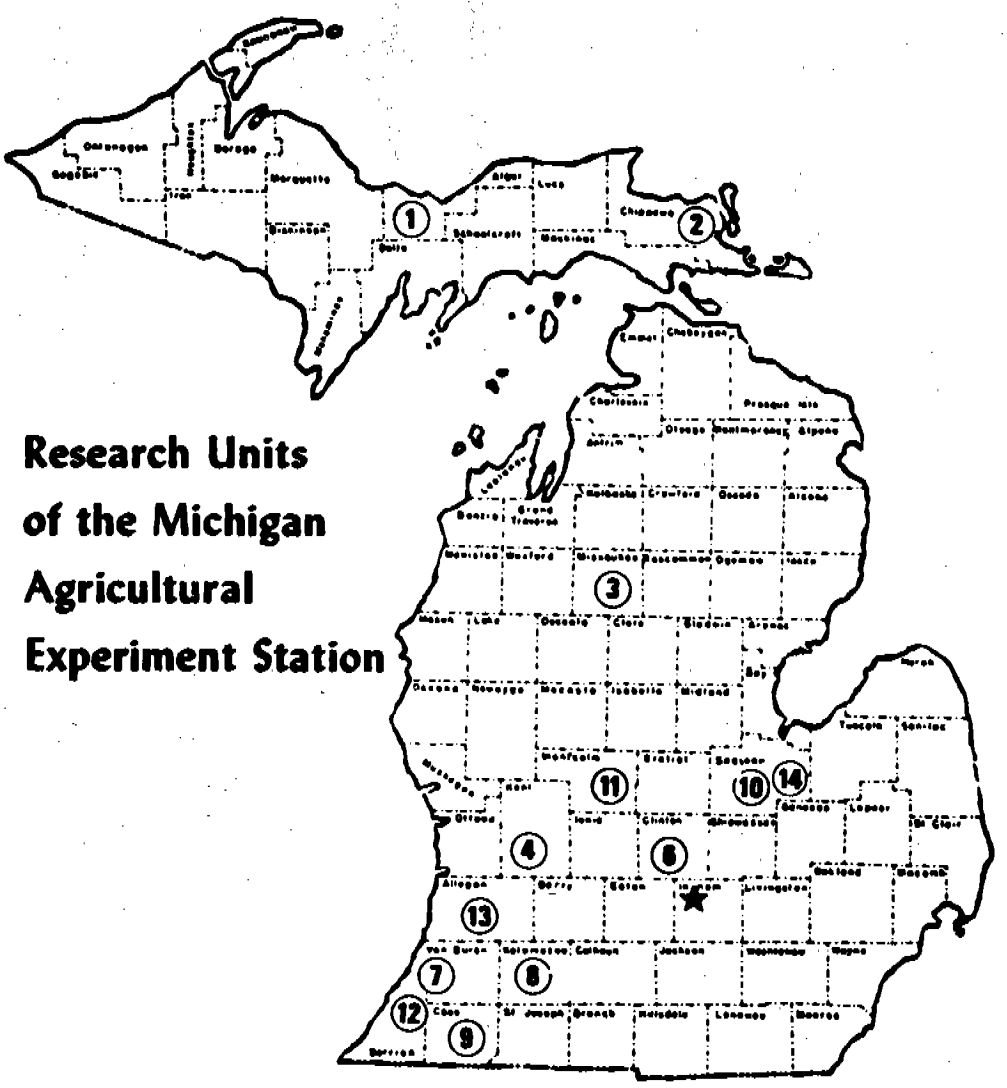
Fig. 3. Wheeler (right) matures about 1 to 2 weeks later than Balbo rye (left).

VARIETAL PROTECTION

Wheeler is protected under the U.S. Plant Protection Act of 1970. Under this act, the varietal name "Wheeler" is limited to certified seed use.[2] It is a violation of the Federal Seed Act to sell uncertified rye seed under the name of Wheeler. This assures seed buyers of the proper variety and should insure long-term genetic stability for Wheeler.

[2]Certified seed will be available for Fall 1972.

Research Units of the Michigan Agricultural Experiment Station



(1) Upper Peninsula Experiment Station, Chatham. Established 1907. Beef, dairy, soils and crops. In addition to the station proper, there is the Jim Wells Forest.

(2) Dunbar Forest Experiment Station, Sault Ste. Marie. Established 1925, forest management.

(3) Lake City Experiment Station, Lake City. Established 1928. Breeding, feeding and management of beef cattle; and fish pond production studies.

(4) Graham Horticultural Experiment Station, Grand Rapids. Established 1919. Varieties, orchard soil management, spray methods.

★ Michigan Agricultural Experiment Station, Headquarters, 101 Agriculture Hall, MSU, East Lansing. Established 1888. Research work in all phases of Michigan agriculture and related fields.

(6) Muck Experimental Farm, Laingsburg. Plots established 1941, crop production practices on organic soils.

(7) South Haven Experiment Station, South Haven. Established 1890. Breeding peaches, blueberries, apricots. Small fruit management.

(8) W. K. Kellogg Farm and Bird Sanctuary, Hickory Corners, and W. K. Kellogg Forest, Augusta. Established 1928. Forest management, wildlife studies, mink and dairy nutrition.

(9) Fred Russ Forest, Cassopolis. Established 1942. Hardwood forest management.

(10) Ferden Farm, Chesaning. Plots established 1928. Soil management, with special emphasis on sugar beets. (Land Leased)

(11) Montcalm Experimental Farm, Entrican. Established 1966. Research on crops for processing, with special emphasis on potatoes. (Land Leased)

(12) Sodus Horticultural Experiment Station, Sodus. Established 1954. Production of small fruit and vegetable crops. (Land Leased)

(13) Trevor Nichols Experimental Farm, Fennville. Established 1967. Studies related to fruit crop production with emphasis on pesticides research.

(14) Saginaw Valley Beet and Bean Research Farm, Saginaw. Established 1971. Studies related to production of sugar beets and dry edible beans in rotation programs.

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